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Scotland's Lead

INTEGRATION is a beguiling word; and we tend perhaps to mistake the repeated utterance of it for its achievement. Since the late war the need for integrating the hospital and general medical services has been voiced again and again; but, despite some useful gestures—notably, prompting hospitals to offer part-time appointments to general practitioners—the process has not advanced far. Scotland has now given a new lead. The Department of Health, together with the Joint Consultants Committee and the General Medical Services Subcommittee, has evolved a plan by which young doctors may divide their training period between hospital and general practice, and those who have completed training may continue as part-time principals in general practice, spending the rest of their time in a hospital appointment. The training period, lasting two years, is to start after the preregistration year or on completion of National Service; the trainee will work half-time in hospital as senior house-officer or registrar, and half-time in general practice under the guidance of an experienced doctor.

The merits of this scheme are clear. The clinician who passes his early postgraduate years solely in hospitals equips himself fully for neither specialist nor general practice; for a patient withdrawn into hospital from home and work and leisure may betray no more of the stresses which have brought him there than does a tissue section of a biochemical process. Furthermore, whereas hitherto many who have found no permanent career in hospital have turned to general practice untrained, and often in the spirit of disgruntled outcasts, under the new scheme such practitioners will approach this alternative work prepared—and perhaps less reluctant. Nor will the scheme be valuable only to the trainees. At present the world of hospital practice is divided from the world of general practice by a lack of links in everyday activities; and the trainees, going to and fro, cannot but bring the two together, to the refreshment of each. Finally, the scheme may mark the start of more coherent care of patients; the prevalent disparity in treatment between hospital and general practice is surely due not only to differing resources but also to lack of mutual understanding.

This plan will call for good will between the two branches of the service; and suitable hospital posts are expected at first to be few. But small beginnings are not to be despised.

A New Serotype of Esch. Coli

Two recent papers report the identification of *Escherichia coli* type O.128 : B.12. TAYLOR and CHARTER,[1] of the Salmonella Reference Laboratory at Colindale, describe how this serotype was first isolated from babies ill in Coventry during July, 1953, and ROGERS and his colleagues[2] give an account of the epidemic that this organism caused at the Birmingham Children's Hospital three months later.

A laboratory at a children's hospital has access to material isolated from circumscribed epidemics of infantile gastro-enteritis among a highly susceptible community, but such a laboratory rarely has the means to identify all the antigens in a hitherto undescribed *Esch. coli* serotype. The reference laboratory, on the other hand, may handle specimens from similar epidemics from widely separated areas, and it is therefore in a position not only to make a careful analysis of the organisms but also to suggest when epidemics may be related. The reference laboratory is also in communication with similar laboratories in other countries, and a new serotype can thus be characterised within the internationally accepted classification. The serological classification of *Esch. coli* depends on the identification of the somatic, surface, and flagella antigens, and it is known that a particular somatic antigen may be associated with more than one type of surface or flagella antigen. Though the detailed serological analysis is not essential in routine investigations, it is certainly essential to progress in this particular field. The extremely careful and detailed investigations[1] into the antigenic composition of *Esch. coli* type O.128 showed that an unusual combination of antigens was present, and it is worth noting that the Coventry and Birmingham strains were the only ones which had the surface (B) as well as the slime antigens: they also had the same flagella (H) antigen, which could suggest that these were related outbreaks.

These accounts of *Esch. coli* type O.128 lend weight to our recent remark[3] about the valuable help that the reference laboratories give to the hospital bacteriologists in this country; we also noted how a similar liaison in the United States had led to the identification of another of the serotypes of *Esch. coli* (O.127 : B.8.)[4,5] which are now considered to cause epidemic infantile gastro-enteritis. It is interesting to compare the methods by which control was established in the epidemics due to *Esch. coli* type O.128, in Birmingham and type O.127 in America. The Birmingham workers, who were dealing with an epidemic which attacked babies already ill, closed their affected wards and only readmitted babies after those wards had been emptied and fumigated. It would be hard to prove that closing the wards prevented a more serious or prolonged epidemic in Birmingham, but the epidemic was certainly relatively mild, although the specific serotype was found amongst the babies in two wards. TODD and HALL[6] were the first to show that when babies became excretors of the specific serological types of *Esch. coli*, chemoprophylaxis reduced the incidence of gastro-enteritis. When it is not expedient to close a ward or unit, this form of chemotherapy can be valuable, as STULBERG and his colleagues[4] showed. They had to deal with an epidemic amongst babies who were well but premature: they continued to admit other premature babies to the unit and they relied on neomycin prophylaxis to limit the epidemic, although sometimes therapy had to be continued for very long periods because of the liability to bacteriological relapse.

Both American and British workers screened their new admissions for the presence of the new pathogenic sero-

1. Taylor, J., Charter, R. E. *J. clin. Path.* 1955, **8**, 276.
2. Rogers, K. B., Cracknell, V. M., Buchanan, E. H., Halley, H. *Ibid*, p. 282.
3. *Lancet*, 1955, ii, 911.
4. Stulberg, C. S., Zuelzer, W. W., Nolke, A. C., Thompson, A. L. *Amer. J. Dis. Child.* 1955, **90**, 125.
5. Ewing, W. H., Tanner, K. E., Tatum, H. W. *Publ. Hlth Rep., Wash.* 1955, **70**, 107.
6. Todd, R. M., Hall, E. G. *Brit. med. J.* 1953, i, 1359.

type, once the specific antiserum became available, and both found it in babies outside the hospitals in which they worked. ROGERS commented on his good fortune in having specific serum so quickly available, since TAYLOR had already prepared it against a strain isolated a few months earlier.

This recent work illustrates the importance of continuing the search for new serotypes. SMITH [7] has described how these various types have been prevalent in different areas at different times and it is certain that in the future more serotypes will be identified and added to the list of those which are known to be pathogenic in babies.

Visiting In Mental Hospitals

To be happy, we all need to feel secure; and insecurity has long been recognised as one of the most potent causes of illness. The overt causes of personal insecurity are plain to see, and, given the means, easy to treat. But, just as social reformers have learnt that money is no substitute for employment, so psychiatrists know that their patients' emotional troubles are seldom cured, though they may be eased, by the relief of practical difficulties.

Whether we like it or not, we all start life as members of a group; and most of us are fortunate enough to spend at any rate the first years of life in the smallest unit of that group—the family. As the nucleus of personal security, there seems to be no adequate substitute for the family, and we have abundant evidence of the ill effects of the absence of family ties. We know too, how much support these ties can give in illness—and especially mental illness, when the sense of security is so often lost. It is a pity, therefore, that the psychiatrist in a mental hospital, though he is well aware of his patient's family and often of their need for his advice, should often have difficulty in meeting them. In so far as mental hospitals remain geographically and spiritually isolated, their doctors must deal with the patients' social problems by artificial methods: group treatment is only a substitute for family treatment. The promising results in the treatment of all types of mental illness in day hospitals and small units in urban areas may well be due as much to the closer contacts between the doctor and the family as to the preservation of the patient's social ties brought about by the ease of association with relatives and friends. In other mental hospitals, for their contacts with the patient's family, the doctors must largely rely on visiting days. The easier it is made for relatives and friends to visit a patient, the easier it is for the doctors to establish contact with them.

Frequent visiting is also directly helpful to the patient. A child who refuses to "settle down" in hospital was formerly considered neurotic; but the need to maintain family contacts has now been accepted, and by permitting daily visiting much has been done to mitigate the harm caused by separating children from their parents. But, as Mr. WOODLEY points out on another page, it is equally important that the adult patient in a mental hospital should not lose touch with home. Other considerations apart, the experience of illness changes a patient, and relatives should have the time and opportunity to adjust to this change while he is still in hospital.

The gravest problem in the modern mental hospital is the reablement of the patient who has lost touch with the outside world. Modern methods of treatment have so far reduced the length of stay of the average patient that "settling down" is no longer essential to recovery: indeed for not a few it is a danger to be avoided. Daily contact with friends and relatives, whether for social or therapeutic reasons, can do little harm and may do much good. An increasing number of mental hospitals already allow, or even encourage, daily visits from relatives, and there are no insurmountable reasons why all should not do so.

7. Smith, J. The Ætiology of Epidemic Infantile Gastro-enteritis. Royal College of Physicians of Edinburgh Publications, 1955, no. 5; see *Lancet*, 1955, ii, 1182.

Annotations

FORCES' MEDICAL AND DENTAL SERVICES

IN 1953 the Minister of Defence appointed a committee, under the chairmanship of Viscount Waverley, to report on the medical and dental services of the Armed Forces. The committee, whose medical members are Sir Harold Boldero and Sir Arthur Porritt, has now reported.[1]

The question whether the three medical branches should be amalgamated the committee answers with an emphatic No; but, it says, joint use of hospitals should be extended, in the United Kingdom unnecessary duplication should be avoided, and the Services should consider establishing a specialist hospital for traumatic surgery. Both the Army and the Air Force should have specialist sections in which officers would continue in their specialist work for their whole career, with the chance of attaining the rank of at least colonel (or group captain). The dental branches should be further coördinated, and the prospects for dental specialists improved. The pay of lieutenant and captain medical officers should be increased to conform with the scales lately announced for combatant officers (this involves increases of from 5*s*. 6*d*. to 7*s*. 6*d*. a day). Increases for higher ranks are also proposed. The pay of dental officers should be the same, rank for rank, as that of medical officers

The committee's many recommendations would have the effect of enhancing the professional and financial attractiveness of the Services, and thus of stimulating recruitment.

INFECTION IN HOSPITAL

CLEAN air, clean food, clean instruments: this is Dr. Maurice Mitman's recipe for averting infection in hospital. In his presidential address to the section of epidemiology and preventive medicine of the Royal Society of Medicine on March 16, he showed that this is no cheap recipe; but he also questioned whether hospitals are making the fullest use of the ingredients at their command. Nowadays of the infectious diseases only smallpox calls for rigid isolation in a separate hospital; other infections can be treated side by side in the modern isolation hospital with proper nursing techniques. General hospitals do not apply the principles of isolation rigorously enough. Cases of non-tuberculosis respiratory infection should be classified and, like the tuberculous, segregated. Likewise patients with early poliomyelitis should be isolated. These and other infectious diseases Dr. Mitman pictured as being handled increasingly in infectious-disease units attached to general hospitals. Concerned at the difficulty in keeping the air clean in general hospitals, Dr. Mitman is attracted to the idea of wards as domitory units (an idea made more practicable by early ambulation). This involves an increase in ancillary rooms which, by adaptation, should be extended at the expense of beds. Among such rooms should be an examination room and a treatment suite, on the lines of an operating-theatre suite, including clean and dirty utility rooms. Soiled dressings could, if dry, be incinerated in the ward; if wet, enclosed in destructible waterproof containers. To prevent losses, soiled linen is still sorted in wards—a practice conducive to infection. Infant feeds should be prepared under aseptic conditions in a formula room. In hygienic standards, notably in the kitchen, hospitals should give a lead to industry: hitherto such a lead has been lacking. Dr. Mitman emphasised that both staff and patients are especially liable to infection in the ward and the kitchen; for the staff the laundry is a special hazard.

WOUND HEALING

IT now seems that epithelium is the prime mover in the the healing of an incised wound. In demonstrating that epidermal cells pour downwards into the wound long before connective-tissue regeneration has started, Gillman et al.[1] have upset the view that connective-tissue repair precedes epithelial regeneration. Their work has been extended to excised wounds in areas from which split skin grafts have been taken. Here again the raw surface is covered at the out-

1. Forces Medical and Dental Services Committee: First Report. H. M. Stationery Office. Pp. 64. 3*s*.

set with epithelial cells derived from the wound edges and the skin appendages lying in the base of the wound; these cells grow underneath the superficial clot and cover the wound within four days. They then lie on a saucer, and are gradually lifted and brought level with the normal skin surface by a blister of exudate containing glycogen and protein, which becomes invaded, between the sixth and tenth day after the injury, by round cells, capillaries, and reticulin fibres. New connective tissue is now forming and though the activity of the epithelial cells is still manifest at this stage in the formation of "pseudo" rete pegs, epidermal regeneration is about to wane; for very shortly these pegs become separated from the surface and contained in small pearls by the developing connective tissue. The pegs are eliminated after three to six weeks by the connective tissue, and the deep epithelium at the site of the wound becomes straight; but at no time does either epithelium or dermis in the donor area regain its original morphology. Wounds deep enough to cause loss of dermis behave differently in that classical granulations must form and grow up from the base of the wound before epithelium can regenerate; it therefore seems that the dermis is in some way responsible for the initial invasiveness of epidermal cell in the earlier stages of wound healing, just as it ultimately controls and limits it. In conformity with the process in the main incision, Gillman et al. find that epithelium invades the track of a skin suture, thus accounting for the punctate scars which remain after removal of skin stitches; these can be avoided by closing skin wounds with adhesive tape, a method which they [2] and Williamson[3] recommend.

Q FEVER

Q (query) fever remains a suitable name for a disease whose natural history is still confused and obscure. There can be no doubt that many human infections are derived from direct contact with cattle, sheep, or goats, alive or dead. *Rickettsia burneti* has been isolated from all three species: it may be present in their milk or, in enormous numbers, in the products of conception. Infection of man by man is rare but laboratory infection not uncommon. So far the likeness to brucellosis in epidemiological habit is close. Not every human infection can however be traced with certainty to an animal source. Some epidemics among soldiers during the Italian campaign were attributed in retrospect to sleeping in cow byres. On the analogy of other rickettsial infections, it has been suspected that the original reservoir of *R. burneti* might be in some arthropod. Infected ticks have been found in Australia, Germany, and England but their connection with human infection is not apparent. In California (where the disease seems remarkably common) serological evidence of past infection was found, not only in 20% of those engaged in dairying, but in 1% of those who had no personal contact with animals and who drank no raw milk.

In this country blood from 95 out of 4456 donors gave a positive complement-fixation test for *R. burneti*; and sporadic infections make up a small but fairly constant proportion of the aggregate of "atypical pneumonia". Many of these cannot be traced in any way at all to the larger domestic animals, while others occur in places where animals are known to be infected but where clear demonstration of the channel of infection is so far wanting. A recent small epidemic in Cardiganshire exemplifies this[4]. 15 people in three near-by villages were infected within a few weeks. No common factor was found in food, drink, or personal environment. It was the lambing season (and the uterine discharges from an infected animal tend to be heavily charged with *R. burneti*) but not all the patients were actively concerned with lambing. Of the sheep with which some of the patients had been in contact, 3·5% gave some serological evidence of infection but the rickettsia could not be detected in the ewes' milk. A pertinacious inquiry ended with the problem so far unsolved chat the investigators suggest some unrecognised source of infection, common to man and animals. Those who see no future in the epidemiological investigation of infectious disease should accept the challenge. Ticks are not the only arthropods which plague us and our beasts: another rickettsial disease, scrub typhus, is spread by trombiculid mites. Not much attention has been paid to infection in the smaller animals kept as pets. It was suggested long ago that the epidemics in Italy were due to the inhalation of dust containing particles of infected cow dung. Knowing that *R. prowazeki* will survive for many months in dried louse faeces, this was a most reasonable guess.[5] Farm buildings are dusty places and even in this mechanical and tarmacadamed age animal faeces must make up an appreciable part of the road dust inhaled by the countryman every fine day and by his urban visitors at weekends.

1. Gillman, T., Penn, J., Bronks, D., Roux, M. *Brit. J. Surg.* 1955, **43**, 141.
2. Gillman, T., Penn, J., Bronks, D., Roux, M. *Lancet*, 1955, ii, 945.
3. Williamson, P. *Ibid.* Jan. 28, 1956, p. 206.
4. *Mon. Bull. Minist. Hlth Lab. Serv.* 1956, **15**, 10.
5. Starzyk, J. *C. R. Soc. Biol. Paris*, 1936. **123**, 1221.

HIDDEN BENEFITS

Today we are all citizens and taxpayers of the Welfare State. Many people feel that these two rôles give them the right to play a third—that of a critic—and they readily offer their views on the administration and scope of the social services.

The commonest complaints are that the Welfare State has tried to do too much too quickly, that it has sapped the moral fibre of the nation, and that it has imposed an excessive burden on the middle classes. But Prof. R. M. Titmuss[6] thinks that these objections arise mainly from lack of clearness about the meaning of the term "social service". Such uncertainty is, indeed, excusable, for during the past fifty years the term has been extended from provision for such limited communal needs as poor relief and sanitation to include the universities and public museums. Nor has the Treasury, Professor Titmuss admits, made things easier. The welfare services which it recognises as social services seem to be chosen haphazard, and its classification has been influenced by administrative convenience rather than similarity of purpose. Thus family allowances count as a social service but remission of taxes for children does not; compensation to doctors for the goodwill of their practices counts as a social service but superannuation under an occupational pension scheme does not. These two examples of apparently illogical classification are also examples of two large groups of concealed social services which Professor Titmuss describes as fiscal welfare and occupational welfare.

These two often unrecognised groups of social services now cost a lot of money—more perhaps than is generally recognised. Thus a father with two children under 15, if he has an income of £2000 a year will receive over the life of the family a "bounty" of £1455; if he has an income of £400 a "bounty" of only £422. Similarly occupational pension schemes "cost the Exchequer" £100 million a year, which is more than the present Exchequer cost of National Insurance pensions. Professor Titmuss holds that, though these fiscal and occupational reliefs have sound and admirable aims—to strengthen the family or to promote good relations in industry—they distort our social services because, by offering greater benefits to the highly paid than to the less well paid, they are "enlarging and consolidating the area of social inequality". The alternative view, of course, is that these tax reliefs do not in fact do enough, in a period of inflation, to mitigate the egalitarian effect of taxes which rise so rapidly with income that (in the words of the Financial Secretary to the Treasury [7]) it has become hard to remunerate adequately men in any walk of life who carry great responsibilities. Professor Titmuss's use of the word "bounty" is no doubt technically correct; but to the ordinary taxpayer it sounds a little odd as applied to permission to retain, for socially useful purposes, a little more of one's own money

6. Social Division of Welfare. Rathbone lecture by R. M. Titmuss. Liverpool University Press. 1956. Pp. 23. 2s. 6d.
7. See *Lancet*, Feb. 18, p. 296.

AFTER MENINGITIS

We have suggested[8] that those who treat meningitis in children have a duty to follow their patient's progress for many years. The early results of treatment may seem better than they really are; for "mental defect is notoriously elusive in early childhood and epilepsy commonly matures silently between the primary insults and the onset of seizures."[9] Desmit,[10] writing from the Hague, reports 114 cases treated between 1949 and 1954. The minimum follow-up period was rather short—six months. 4 children (2 of whom died) were excluded from the survey. Of the remaining 110, 8 died and and 16 were left with gross defects. Thus the least possible failure-rate in this series was 22%. The figure might well increase if the children were followed for a longer time. Desmit points out that convulsions and prolonged coma were common in those with permanent damage, and he suggests that the illness in these children was encephalitic as well as menin-

8. *Lancet*, 1953, ii, 768
9. Smallpeice, V., Ounsted, C. *J. Neurol. Psychiat.* 1952, **15**, 13
10. Desmit, E. M. *Arch. Dis. Childh.* 1955, **30**, 415

gitic. In striking contrast to Ingraham's experience,[11] Desmit found no subdural effusions.

When powerful antibiotics were first introduced, the problem of purulent meningitis seemed to be solved; but plainly there is as yet no agreement about the course, treatment, and outcome of these infections. Ounsted[12] has pointed out that the number of children with brains mutilated by meningitis is increasing rapidly. Such children are prone to gross forms of epilepsy and disordered behaviour; and, quite apart from the personal tragedies involved, the community must bear this costly burden for many years. There is a clear indication for a carefully planned and well-controlled study of the treatment and outcome of purulent meningitis.

11. McKay, R. J., Ingraham, F. D., Matson, D. D. *J. Amer. med. Ass.* 1953, **152**, 387
12. Ounsted, C. *Lancet*, 1955, ii, 303.

Occasional Survey

GASTRO-INTESTINAL COMPLICATIONS OF ORAL ANTIBIOTICS *

MINOR intestinal symptoms are not uncommon when antibiotics are given by mouth. Any part of the alimentary tract may be affected—sore tongue and mouth, nausea, occasional vomiting, abdominal distension, diarrhœa, and the so-called anorectal syndrome, which, incidentally, may persist for weeks after the antibiotic is stopped.[1 2]

PREDISPOSING FACTORS

The frequency of these complications, which may be as high as 30% or more,[3–6] depends on a number of factors. The most important of these is the breadth of the drug's antibacterial spectrum. The tetracyclines are therefore the worst offenders. Oral penicillin gives less trouble because it leaves coliform bacilli unaffected. Injected penicillin and streptomycin, singly or in combination, very rarely produce alimentary symptoms since very little of either penetrates the intestinal lumen.

The antibacterial spectrum, however, cannot be the only factor involved, since the spectrum of all the tetracycline drugs is virtually the same, yet it is generally agreed that tetracycline itself is less likely to give rise to complications than either chlortetracycline or oxytetracycline[7]; it is probable that chloramphenicol and neomycin, which have similar antibacterial spectra, are still less likely to cause digestive disturbances.[8] It seems that the difference is due to chemical irritation of the gut. Certainly the tetracyclines are very irritant on injection, not infrequently causing thrombosis when injected intravenously and considerable pain when injected intramuscularly, even when given with procaine. Chemical purity may have been a factor in the past. It has been claimed that thrice-crystallised chlortetracycline is better tolerated than the original impure preparations.[9]

Finally, the incidence of enteral complications is closely related to the dose of the drug and its duration. Finland and others [5] showed that symptoms occurred twice as often with a dose of 250 mg. of chlortetracycline given four-hourly as with the same dose six-hourly.

PREVENTION

It follows that alimentary side-effects may be minimised by:

(1) Interfering with the gut flora as little as possible. This implies using sulphonamides or penicillin by injection when suitable. It is highly important that, when sterilisation of the bowel is required, only drugs effective against any locally endemic staphylococci should be used. It is asking for trouble to remove all the normally resident non-pathogenic bacteria from the intestine in an environment where resistant staphylococci are prevalent.

(2) Nausea and diarrhœa can be reduced by giving milk with each dose of oral antibiotic. Alkalis such as aluminium hydroxide and magnesium trisilicate, though effective, should not be used for this purpose since they interfere with absorption.[9] Several authors have reported that yogurt given in doses of one cupful three or four times a day is effective, both in prophylaxis and treatment of antibiotic-induced diarrhœa.[1 2 10] Perhaps yoghurt should be made from an antibiotic-resistant strain of lactobacillus. Various vitamin-B preparations have been recommended for these purposes, but it is doubtful whether they are of much value.[11–13] Cathartics should be avoided.[5]

(3) The dose and duration of treatment must be kept down to the minimum that is effective.

SUPERINFECTION

The vast majority of alimentary complications are due to minor disturbances in bacterial ecology and to the irritant effect of the antibiotic on the intestinal wall. They subside rapidly when the drug is withdrawn. However, in the past few years there has been a disturbing number of reports of superinfection by resistant organisms such as monilia[14–17] and staphylococci,[13 18–21] which may become widely disseminated throughout the body. Usually one or more broad-spectrum antibiotics have been given, but staphylococcal superinfection has occasionally followed the use of intramuscular penicillin and streptomycin in combination [20–22] and in one unpublished non-fatal case it followed a week's course of intramuscular penicillin alone. In two of three cases mentioned by Barber and Burston [23] no antibiotic at all had been given.

Clinically the syndrome is very like that of pseudomembranous enteritis reported occasionally in pre-antibiotic days, usually associated with postoperative shock.[18 24] In the unpublished case mentioned above the enteritis did in fact follow a thigh amputation, and it is difficult to be sure of the part the administration of penicillin played in its development. Though both are excreted to a small extent in the bile,[25 26] it is inconceivable that injected penicillin and streptomycin, alone or together, could sterilise the gut. A more likely explanation is that these antibiotics, especially in combination, may virtually sterilise the nose, throat and respiratory tract, so promoting their colonisation by resistant staphylococci which gain a foothold in the alimentary tract through the patient swallowing his own secretions.

* Based on a contribution to a symposium on Staphylococcal Infections in Hospital held at the Whittington Hospital on Nov. 30, 1955. I am indebted to Dr. J. M. Alston and Dr. A. L. Jacobs for information and advice.

1. Manheim, S. D. *N.Y. St. J. Med.* 1951, **51**, 2759.
2. Willcox, R. R. *Lancet*, 1951, ii, 154.
3. Medical Research Council. *Brit. med. J.* 1951, ii, 1361.
4. Harris, H. J. *J. Amer. med. Ass.* 1950, **142**, 161.
5. Finland, M. et al. *Arch. intern. Med.* 1954, **93**, 23.
6. Frei, E. *New Engl. J. Med.* 1955, **252**, 173.
7. Welch, H. *Antibiot. & Chemother.* 1954, **4**, 375.
8. Spink, W. W. *J. Amer. med. Ass.* 1953, **152**, 585.
9. Welch, H. Principles and Practice of Antibiotic Therapy. New York. 1954.
10. Polymenakos, L. G. *Lancet*, 1954, i, 732.
11. Romansky, M. J., Kesler, G. A. *J. Amer. med. Ass.* 1952, **150**, 1447.
12. Anderson, T. *In* Dunlop, Davidson, and McNee's Textbook of Medical Treatment. Edinburgh, 1953; p. 88.
13. Hay, P., McKenzie, P. *Lancet*, 1954, i, 945.
14. Taylor, H., Rundle, J. A. *Ibid*, 1952, i, 1236.
15. Wolff, F. W. *Ibid.*
16. Brown, C., Propp, S., Guest, C. M., Beebe, R. T., Early, L. *J. Amer. med. Ass.* 1953, **152**, 206.
17. Browne, S. G. *Lancet*, 1954, i, 393.
18. Dearing, W. H., Heilman, F. R. *Proc. Mayo Clin.* 1953, **28**, 121.
19. Gardner, D. L. *Lancet*, 1953, ii, 1236.
20. Todd, A. S., Hopps, P. O. D. *Ibid*, 1953, ii, 749.
21. Fowler, B. J. *Brit. med. J.* 1955, i, 1313.
22. Fairlie, C. W., Kendall, R. E. *J. Amer. med. Ass.* 1953, **153**, 90.
23. Barber, M., Burston, J. *Lancet*, 1955, ii, 518.
24. Penner, A., Bernheim, A. I. *Arch. Path.* 1939, **27**, 966.
25. Florey, H. W., et al. Antibiotics. London, 1949; p. 1290.
26. Waksman, S. A. Streptomycin. Baltimore, 1949; p. 248.

Relative to the usage of antibiotics, superinfection of this type is extremely rare. But when it occurs it is often dramatic and disastrous, and constant vigilance is therefore required whenever oral antibiotics are used and particularly when an attempt is being made to sterilise the gut. Several authors have remarked that patients look and feel quite well in the early stages of a rapidly fatal diarrhœa.[22] In staphylococcal enterocolitis it is probable that they remain well until the blood biochemistry becomes upset and possibly also staphylococcal toxin has accumulated to produce toxæmia.[22 27] At this stage the patient becomes profoundly ill and may die within a matter of hours. The clinical course has been aptly compared with that of cholera.

Being so much quicker, bacteriological examination of a slide is preferable to culture of the patient's stools and may more accurately reflect the bowel flora present. Usually one organism predominates. Those most often found are monilia, staphylococci, proteus, and pseudomonas.

TREATMENT OF SUPERINFECTION

In staphylococcal cases early recognition is imperative; other organisms are not so rapidly fatal. In a number of reported cases symptoms have quickly resolved on stopping the drug [5 18 27] which is clearly the first essential. When the blood biochemistry has become deranged, urgent and strenuous efforts are required to restore it to normal. The chief needs are for water, sodium, chloride, and potassium—in that order—and intravenous therapy is almost invariably necessary. Depending on the result of bacteriological examination of a smear of the patient's stool, specific chemotherapy should be started as soon as possible. With the introduction of new drugs during the past year or two the prospects of success have improved considerably.

CHEMOTHERAPY OF SUPERINFECTION

Proteus.—This organism may be found in up to 20% of normal stools and is usually regarded as innocuous. It may not be innocuous when it becomes the predominant organism in the bowel.[28] It is notoriously resistant to antibiotics. Some strains are sensitive to oral streptomycin 0·5 g. q.i.d. or to neomycin 1·0 g. q.i.d.

Pseudomonas pyocyaneus.—Least often guilty of the sinister quartet, this organism is usually susceptible to polymyxin B, a bactericidal antibiotic effective against gram-negative bacilli. Though originally nephrotoxic and still liable to produce malaise, fever, skin rashes, and pain when given intramuscularly, polymyxin produces no such side-effects when given orally, for it is very poorly absorbed.[29] It may be given as aerosporin 500,000 units every six hours.

Monilia.—Candida albicans may be found in 10–20% of normal stools and, after broad-spectrum antibiotics, in up to 60% of patients, though it rarely does any apparent harm.[30] While it is unlikely that these drugs heighten the virulence of monilia,[4 31 32] there have been many reports of both alimentary and generalised moniliasis following the use of broad-spectrum antibiotics. Hitherto this has been an exceedingly difficult condition to treat, but there are now promising reports of the use of diamidines,[33 34] *p*-hydroxybenzoic acid and its esters [31] and fatty acids.[35] Recently a new antifungal antibiotic 'Nystatin' has become available. This is derived from *Streptomyces noursei*, and in vitro it is very effective against fungi and yeasts, especially in the dividing phase. It appears to be of considerable value for the treatment [36] or prevention [37] of intestinal moniliasis. Though only a small proportion is absorbed it is said to improve some cases of moniliasis of the skin and genito-urinary tract.[38] Oral dosage is 500,000 units thrice daily or twice this if necessary.

Staphylococcus.—Strains resistant to some or all of the usual antibiotics are found much more often in hospital than among the general public.[39] Staphylococcal enterocolitis, now the most serious of all forms of superinfection, is therefore essentially confined to hospital patients. It usually develops after three to five days of chemotherapy, when the normal bacterial population has been reduced to a minimum and the field is left clear for resistant organisms. Debility is a contributory factor. The best available drug for its treatment is erythromycin, which suppresses staphylococci but permits the return of *Escherichia coli*.[16 27] The antibacterial spectrum of erythromycin is very similar to that of penicillin but it also affects some rickettsiæ and larger viruses. It is important to reserve it for the treatment of penicillin-resistant organisms or penicillin-sensitised patients. Its indiscriminate use would soon lead to the emergence of erythromycin-insensitive staphylococci as resistance to it can develop with great rapidity.[40] It is issued in acid-resistant tablets of 100 mg. each. The dose for an infant is 100 mg., for a child 200 mg., and for an adult 300 mg. six-hourly. If necessary, higher doses may be given as it is tolerated quite well and seldom gives rise to more than minor gastro-intestinal upset.

An alternative is to use neomycin, which is a bactericidal antibiotic effective against gram-positive, gram-negative, and acid-fast bacilli. It does not show cross-resistance with other antibiotics. Its parenteral use is strictly limited by its toxicity for the kidney and for the ear; but doses of under 0·5 g. per day are regarded as safe for short periods.[9] Orally, only about 3% is absorbed and toxic effects of any sort rarely, if ever, occur.[41 42] Its advantages are that at the present time it is effective against staphylococci (including those endemic in hospitals) and many strains of proteus and *Pseudomonas pyocyanea*. Resistance to it develops slowly.[43] It is particularly suitable for preoperative preparation of the bowel because it is effective in about twenty-four hours and sterility is maintained for two or three days after operation without further dosage. In a recent paper Rowlands and Scorer [42] found that 1·0 g. orally every four hours for six doses sterilised the stools of nearly 30% of their patients. When preceded by 4 × 1 g. doses at hourly intervals the proportion rose to 45%. Waisbren [43] also considers neomycin alone satisfactory, but Poth [41] found that on neomycin alone the stools of 10% of patients grew resistant *Aerobacter aerogenes*. He therefore gave 1·5 g. of phthalyl sulphathiazole in addition to 1·0 g. of neomycin four-hourly for forty-eight hours before operation, and he regarded this combination as the best available. Unfortunately strains of staphylococci resistant even to neomycin have appeared in America; so the problem cannot yet be considered solved.[44]

SUMMARY

Symptoms affecting one or more parts of the alimentary tract often follow administration of antibiotics by mouth. Most are mild and transitory but still troublesome.

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They can be minimised by attention to certain well-established principles.

Occasionally superinfection with resistant organisms develops. In recent years the staphylococcus has overshadowed the others in importance. It may produce diarrhœa which, if urgent measures are not taken, may become choleriform and rapidly fatal.

Emphasis is laid on the danger of disturbing the normal intestinal flora in an environment where resistant staphylococci are prevalent.

T. B. BINNS
M.R.C.P., M.R.C.P.E., D.C.H.

Preliminary Communication

RITALIN AS AN ANTAGONIST TO RESERPINE IN MONKEYS

RESERPINE ('Serpasil'), an alkaloid originally made from *Rauwolfia serpentina*, has been given with benefit to many patients both in this country and in America; but there have been many reports of undesirable side-effects, including diarrhœa, nightmares, agitated depression, giddiness, anxiety, parkinsonian-like tremor, asthma, and facilitation of convulsions. Furthermore, it has been estimated that serious mental effects arise in about 5% of patients treated with reserpine—a finding that may cause some hesitation to prescribe the drug.

We have found experimentally that the effects of large doses of reserpine are dramatically reversed by subcutaneous injection of 'Ritalin' (the hydrochloride of phenyl-[α-piperidyl]-acetic acid methyl ester), a new synthetic compound with a specific central stimulating component. The interaction of ritalin and reserpine was observed during studies on the effect of reserpine in monkeys.

We have so far used in our experiments nine monkeys—four *Macaca nemestrina* and five *Macaca mulatta*—adolescent or pre-adolescent animals, weighing 2·5–3·5 kg. In each experiment 5 mg. (2 ml.) of reserpine was injected intramuscularly. About three hours later, when the drug had produced a catatonic-like state, 20 mg. (1 ml.) of ritalin was injected subcutaneously.

The result of injecting 5 mg. of reserpine varied singularly little between different animals, except that in some the onset of symptoms occurred after about one hour and in others after nearly two hours. When the reserpine was fully effective, the animals sat in a fœtal-like position with a parkinsonian-like tremor and flushed hands, feet, and face. Food was ignored or, if placed in the mouth, held between the teeth but not chewed. Patellar and plantar reflexes remained present, and a very strong grasp reflex was established in all four extremities. It was possible to place the monkey's body and limbs in bizarre positions, which were held. Spontaneous activity was abolished, but response to strong stimuli such as a needle-prick remained. When an animal in this catatonic-like state was given 20 mg. (1 ml.) of ritalin, a striking change ensued in three and a half to six minutes. First, eye movements occurred as if the animal were looking around, then the ears and the limbs moved, and finally the animal suddenly "woke up," sat in a normal position, and ate voraciously any food within reach. Within fifteen seconds of "waking up" an animal can leap across a gap of three feet between a table and its cage, and catch the cage bars in a completely normal way, thus demonstrating perfect oculomotor coördination and control of movement. After about six hours, some of the reserpine signs, such as the clenched feet and the fœtal position, reappear, and the monkey's motor activity is depressed; but with only one exception the animals roused themselves when they were offered food. This partial return of "reserpine syndrome" is completely abolished by a further subcutaneous injection of 10 mg. (0·5 ml.) of ritalin—i.e., half the previous dose.

So dramatic is the effect of ritalin that there is little doubt that in these animals it acts as an antagonist to reserpine.

Our observation that the completely abolished "reserpine syndrome" tends to build up again, though to a lesser degree, about six hours after the administration of ritalin suggests that this drug does not "neutralise" nor "wash out" the reserpine.

Bein et al.[2] suggest that the action of reserpine resembles the effects of diencephalic stimulation, and they conclude from their observation of the cat's retracted nictitating membrane that reserpine inhibits the sympathetic outflow and does not stimulate the parasympathetic component of the hypothalamus. A syndrome similar to that observed by us after a large dose of reserpine has been reported in monkeys by Collins[3] following lesions in the posterior hypothalamus reaching into the rostral portion of the midbrain. Hess[4] also observed in cats with mid-hypothalamic lesions a type of behaviour, "adynamia," which closely resembles what we have observed in monkeys.

We therefore assume that reserpine acts at hypothalamic level, favouring the parasympathetic centres either by stimulating them or by depressing the sympathetic centres. The antagonistic effect of ritalin could then be the result either of removal of this depressing effect or of increase in the sympathetic output of the hypothalamus, thus in either case re-establishing a balanced hypothalamic function.

The effects fo amphetamine and bemegride administered after reserpine are also being investigated. The effects of amphetamine closely resemble those of ritalin, with the addition of increased motor activity. The effects of bemegride are very different.

We thank Prof. E. G. T. Liddell for his support, Dr. C. D. Falconer for his interest in this work, and Ciba Ltd. for supplying 'Serpasil' and 'Ritalin.'

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P. GLEES
M.D. Bonn, M.A., D.Phil. Oxfd

University Laboratory of Physiology, Oxford

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Letters to the Editor

Visiting in Mental Hospitals.—Today there is some talk of improved facilities for those who visit patients in general hospitals; but though in their evidence to the Royal Commission the representatives of the Royal Medico-Psychological Association claimed that progress had also been made in mental hospitals, the lack of imagination shown by some medical superintendents is regrettable.

Whether a patient in a general hospital receives visits from friends and relatives is, comparatively, immaterial; for he is conscious of his condition and aware of his surroundings. But for the mental patient—because of the disturbance of judgment wrought by his illness, and his consequent inability to appreciate his predicament—unrestricted visits from friends and relatives are essential. He finds himself suddenly, and perhaps violently, uprooted from everyday life, and cast into the confusion and indignity of a mental-hospital ward—there to wage unequal combat with the unspoken suggestion that he has done something that he ought not to have done, and to regard himself as the object of an accusation, against which he is required to defend himself. Realising that something has occurred to set him apart from other men, he instinctively gropes for that sympathy and understanding which must come first from his friends and relatives, and secondly from psychiatry. Unhappily, however, and all too often, his grasp closes on thin air; for, though half our mental hospitals wisely permit visitors at any reasonable hour on any and every day, the rest limit visits to certain days and specified times.

Since unrestricted visits is the first essential for the patient in a mental hospital, let *all* our mental hospitals throw open wide their doors—and keep them open.—H. G. WOODLEY. (Edzell, Angus.)

Vaccinia versus Poliomyelitis.—Relative to Dr. MacIver's second communication (March 17), I would say that in urban areas in the United States smallpox vaccination takes place almost universally before the child is a year old. In some rural areas this vaccination will not be given until the child enters school, but I would not hazard a guess at the percentages concerned. Many children are re-vaccinated on going to school, and in the Service almost 100% of children as well as parents are vaccinated every three years. Unfortunately poliomyelitis still occurs among our personnel. It is to be hoped that Dr. MacIver's observation is correct, for it would be just one more good argument for vaccination against smallpox—a disease we can control.—Colonel CHARLES H. MORHOUSE, M.D. (Third Air Force, Ruislip, Middlesex.)

Production of Codeine.—Dr. Williams (March 17) shows a lamentable lack of knowledge of the pharmacology of acetanilide and related compounds, and appears to be unaware of the excellent work that has been done in this field by Brodie and others (B. B. Brodie, J. Axelrod, *J. Pharmacol.* 1948, **94**, 22, 29; F. B. Flinn, B. B. Brodie, *Ibid*, p. 76: B. B. Brodie, J. Axelrod, *Ibid*, 1949, **97**, 58). Acetanilide is a dangerous drug because the body de-acetylates part of it into aniline. It is not generally considered, however, that it causes agranulocytosis. Similarly, phenacetin is partially de-acetylated into another, though less dangerous, amine, *p*-phenetidine. The active non-toxic metabolite of acetanilide and of phenacetin is *n*-acetyl-*p*-aminophenol, which is 'Panadol'.

To convert *n*-acetyl-*p*-aminophenol into acetanilide the body would have to de-hydroxylate it—a process that is unknown for phenols which are metabolised in the reverse direction by further oxidation, conjugated with glucuronic and sulphuric acids, or excreted unchanged.

More than two million doses of *n*-acetyl-*p*-aminophenol have already been given to humans, and there have been no authenticated reports of toxic effects. All the available evidence suggests that panadol is a safe analgesic and one that is unusually free from side-effects, which is the main reason for using it.—L. M. SPALTON, B. PHARM., director, Bayer Products Ltd. (Kingston-on-Thames.)

Medicine and the Law

Death due to Penicillin

AN anaphylactic reaction to penicillin caused the death, on Feb. 3, of a man of 34 who the day before had undergone tonsillectomy at the Radcliffe Infirmary, Oxford.[1] At the inquest the patient's doctor said that last October he had attributed symptoms in this man to hypersensitivity to penicillin. A dermatologist had concluded that a rash which had developed was due to a throat infection. After the operation penicillin was ordered (nothing then being known of the hypersensitivity). A rash developed, and the treatment was changed. A staff nurse noted this in the change book but did not remove the patient's name from the penicillin list. On Feb. 3 another nurse, about to inject penicillin, was told by the patient that he was hypersensitive. She relied on the list.

1. *Times*, March 9, 1956.

Obituary

Sir MORTON SMART

Sir Morton Smart, G.C.V.O., D.S.O., manipulative surgeon to King George VI and consultant in physical medicine to the Royal Air Force, died on March 16 at the age of 78. He was born in Scotland, the third son of John Smart, B.S.A., and graduated M.B. from the University of Edinburgh in 1902. During the South African war, he had seen active service and in the 1914-18 war he again served as a combatant, this time as a commander in the R.N.V.R., and was in charge of a gunboat flotilla at the Dardanelles. This background of Service experience sharpened his interest in the problems of reablement. He was especially concerned with the application of his specialty to the problems of the casualties of war and industry, and in 1940 he addressed a committee of the House of Commons on Physical Medicine in War-time.

Dr. WILLOUGHBY-LYLE

We hear with regret of the death on March 13 of Dr. Herbert Willoughby-Lyle. An indomitable little man, full of energy and activity, he lived to the age of 85. And he lived to the full. He was a famous physiology coach in his youth, a first-class ophthalmologist in his prime, a vivid medical teacher, and for over 20 years dean of King's (whose medical school he completed by his own exertions). His association with the school began as a student and ended as dean emeritus; it stretched from 1887 to 1931 and amply qualified him to turn historian. His book, *King's and Some King's Men*, appeared in 1935 and he published an addendum five years ago. He was a highly individual and lovable character, who will not be forgotten by his school or by the thousands he served. Two of his family, Mr. T. Keith Lyle and Dr. Eric Lyle, are members of the medical profession.

News

The trials with an oral attenuated live-virus poliomyelitis vaccine, now being carried out in Northern Ireland under the direction of Prof. G. W. A. Dick, are being extended to include medical students and children whose parents have agreed to their receiving the vaccine. Only those volunteers with no antibody to one or other types of virus will be given the vaccine.

On Feb. 25 the degree of M.D. of the University of Cambridge was conferred on Robert Marshall, D.N. Phear, and Arnold Pines; the degree of M.B. on J. A. Eddington and J. F. M. Newman; and the degrees of M.B., B.CHIR. on J. F. Garner.

The Royal Society of Tropical Medicine and Hygiene has awarded the Manson medal for 1956 to Brigadier J. A. Sinton, V.C., F.R.S.

CORRIGENDA: *Prevention of Hay-fever.*—'Piriton' maleate, mentioned in Dr. Stathers' letter (March 10), is *chlorpheniramine* maleate. *Chest Radiography in Pneumoconiosis.*—In our leading article last week, the last sentence in the second paragraph should have begun; "When allowance is made for Durham miners going to the coalface ten years *later* than their Welsh colleagues..."

Births, Marriages, and Deaths

BIRTHS

WESLEY-JAMES.—On March 10 at Southmead Hospital, Bristol, to Jacqueline (formerly David), wife of Dr. Oliver Wesley-James, a son.

Vacancies

ACADEMIC AND EDUCATIONAL

Inst. of Cancer Research, S.W.3. Clin. Research Path.
Oxford University, Nuffield Dept. of Orthopædic Surgery. Graduate Asst. A.
St. Andrew's University. Refresher Course for G.P.'s. 18th–29th June
Inst. of Laryngology & Otology, & Royal National T. N. & E. Hosp. W.C.1. Course for Cons. Otologists. 1st. 2nd & 3rd May.
St. Andrew's University. Courses of Instruction for D.P.H. & D.P.D. Oct. 1956/June 1957.
Tuberculosis Educational Inst. (Deeside San. Aberdeenshire). Clinical Course. 18th. 19th & 20th April.
Edinburgh University. Regius Prof. of Clin. Surgery.
Glasgow Royal Infy. McIntyre Clin. Research Scholarship.
Bristol University. Asst. Lecturers (Grade III) or Demonstrators in Physiology.
University of London. Readership in Clin. Path.
Singapore. University of Malaya. Sr. Lectureship in Orth. Surg.
National Assoc. for Prevention of T.B., Edinburgh. Post-grad. Fellowship.
St. Andrew's University, Queen's College, Dundee. Asst. in Path.

ADMINISTRATIVE

Newcastle R.H.B. Deputy Sr. Admin. M.O.

ANÆSTHETICS

Lambeth, S.E.11. Locum Reg.
St. George's, S.W.1. Reg.
Hackney Group H.M.C. Sr. H.O.
Hosp. for Sick Child., W.C.1. Reg.
North Middlesex, N.18. H.O.
Royal National T.N. & E., W. Reg.
University College Hosp., W.C.1. P.-t. Cons.
Chesterfield Royal. Reg.
Dublin. St. Laurence's. Asst. Anæs.
Dudley, Stourbridge & Dist. Sr. H.O.
Manchester. Crumpsall. Sr. H.O.
Manchester. South Manchester H.M.C. Sr. H.O.
Manchester R.H.B. Cons.
Newcastle R.H.B. Reg.
Nottingham Gen. Reg.
Sheffield R.H.B. Cons.
Sheffield United Hosps. Reg.
Taplow. Canadian Red Cross Mem. Sr. H.O.
U.S.A. Cambridge, Mass. Residencies

CASUALTY
Hackney, E. 9. H.O.
New End, N.W.3. Jr. H.M.O.
Paddington Green Child's, W.2. Pre-reg. H.O.
Birmingham R.H.B. Sr. Casualty Officer.
Brighton. Royal Sussex County. H.O.'s.
Colchester. Essex County. Sr. H.O.
Croydon Gen. Sr. H.O.
Dudley, Stourbridge & Dist. Sr. H.O.
Manchester. Ancoats. Sr. H.O.
Northampton Gen. Sr. H.O. & H.O.
Swansea. Jr. H.M.O.
Swindon Hosp. Group. Sr. H.O.'s

CHEST AND TUBERCULOSIS
Brompton, S.W.3. H.O.'s.
Central Middlesex, N.W.10. H.O.
Aberdeen, Deeside Sanatoria. Reg. & Sr. H.O.
Bristol, Ham Green. Sr. H.O.
Chester. Barrowmore. Sr. H.O.
Edgware Chest Clinic & Gen. Hosp. Reg.
Ipswich. St. Helen's. H.O.
Newcastle R.H.B. Reg.
Scotland, Northern R.H.B. Jr. H.M.O.
Skipton. The Hosp. Grassington. Sr. H.O. or Jr. H.M.O.

DERMATOLOGY
St. John's Hosp. for Diseases of the Skin, W.C.2. Reg.
Guy's, S.E.1. P.-t. Reg.

EAR, NOSE, AND THROAT
Royal National T. N. & E. & Inst. of Laryngology & Otology. Sr. Reg.
Birmingham & Midland Ear & Throat. H.O.'s or Sr. H.O.'s.
Blackpool, Victoria. Sr. H.O.
Brighton & Lewes H.M.C. Sr. H.O.
Carlisle, Cumberland Infy. Sr. H.O.
Derby, Derbyshire Royal Infy. Sr. H.O
Edinburgh Central Hosps. B.O.M. H.O.
Manchester R.H.B. Reg.
Northampton Gen. Sr. H.O.
Portsmouth Group H.M.C. Sr. H.O.
Reading. Royal Berks. H.O.
Southampton. Royal South Hants. & Gen. Sr. H.O.

GERIATRICS
Birmingham R.H.B. P.-t. Sr. H.M.O.
Leeds R.H.B. Cons.
Newcastle R.H.B. P.-t. Locum Cons.
North East Met. R.H.B. Regs.

HÆMATOLOGY
Adelaide, S. Australia. Australian Red Cross Society. Director of Blood Transfusion Services.

INFECTIOUS DISEASES
Middlesbrough. West Lane. Jr. H.M.O.

MEDICINE
Central Middlesex, N.W.10. H.O.'s.
Royal Free, W.C.1. Jr. H.M.O.
St. Stephen's, S.W.10. Sr. H.O.
Aberdeen Gen. Hosps. B.O.M. Jr. H.M.O.
Chichester. Royal West Sussex. Reg. & Locum.
Edinburgh Northern Group of Hosps. Jr. H.M.O.
Gainsborough. John Coupland. Jr. H.M.O.
Glasgow. Victoria Infy. Sr. H.O.
Hove Gen. Pre-reg. H.O.
Huddersfield, St. Luke's. Jr. H.M.O. & Sr. H.O.
Leeds R.H.B. Pre-reg. H.O.'s.
Medway & Gravesend H.M.C. Sr. H.O.
Newcastle R.H.B. Cons.
Plymouth, South Devon & East Cornwall. Sr. H.O.
Portsmouth Group H.M.C. Sr. H.O. & Pre-reg. H.O.
Portsmouth Group H.M.C. Reg.
Scotland, Northern R.H.B. Jr. H.M.O.
Torquay, Torbay. Sr. H.O.

NEUROLOGY
Leeds R.H.B. Pre.-reg. H.O.

NEUROSURGERY
Romford, Oldchurch. P.-t. Locum Cons.

OBSTETRICS AND GYNÆCOLOGY
Hosp. for Women, W.1. Sr. H.O.
Marie Curie, N.W.3. H.O.
St. James's, S.W.12. Sr. H.O.
Westminster, S.W.1. Temp. Sr. Reg.
Bedford Gen. Sr. H.O.
Birmingham R.H.B. Sr. Reg.
Boston, Gen. Reg.
Chesterfield, Scarsdale. Reg.
Chichester Group H.M.C. Reg.
Croydon, St. Mary's Maternity. H.O.
Doncaster H.M.C. Sr. H.O. or Pre-reg. H.O.
Harrogate & Dist. Gen. Sr. H.O.
Hitchin, North Herts. Reg.
Huddersfield Royal Infy. Pre-reg. H.O.
Ipswich & East Suffolk. Pre-reg. H.O.
Leeds, R.H.B. Pre.-reg. H.O.'s.
Manchester, Northern. Sr. H.O.
North East Met. R.H.B. Sr. Reg.
Portsmouth Group H.M.C. Pre-Reg. H.O.
Reading Combined Hosps. H.O.
Romford, Oldchurch. Sr. H.O.

OPHTHALMOLOGY
Brighton, Sussex Eye. H.O.
Leeds R.H.B. Sr. H.M.O.
Manchester United Hosps. Sr. H.M.O.
Scotland, South-Eastern R.H.B Sr. Reg.

ORTHOPÆDICS
Whittington, N.19. Locum Reg.
Ashford, Middlesex. H.O.
Brighton Gen. H.O.
Cambridge, Addenbrooke's. Reg.
Carlisle, Cumberland Infy. Sr. H.O.
Chertsey, St. Peter's Sr. H.O. or Pre-reg. H.O.
Exeter, Royal Devon & Exeter. Sr. H.O
Leeds R.H.B. Reg.
Northampton Gen. H.O.
Portsmouth Group H.M.C. Pre-reg H.O.
Romford, Oldchurch. H.O.
Scotland, Eastern R.H.B. Sr. Reg.
Southampton. Royal South Hants Sr. H.O.
Stoke-on-Trent, North Staffs Royal Infy. Sr. H.O.
Welsh R.H.B. Sr. H.M.O.
Welsh R.H.B. Reg.
Wigan, Royal Albert Edward Infy. Sr. H.O.

PÆDIATRICS
St. James's, S.W.12. H.O.
Birmingham United Hosps. Sr. H.O. or Reg.
East Anglian R.H.B. Reg.
Kettering Gen. Sr. H.O.
Newcastle R.H.B. Reg.
Nottingham City. Sr. H.O.
Southampton Child's. H.O.
South-East Met. R.H.B. P.-t. Cons.

PATHOLOGY
Royal Marsden, S.W.3. Cons.
Newcastle R.H.B. Sr. Reg.
Oxford United Hosps. Sr. H.O.
Royal Free Hosp. Group. Sr. H.O. & H.O.
S. Africa, Prov. Admin. of Cape of Good Hope, Med. Pract., Grade E.

PHYSICAL MEDICINE
Royal Free, W.C.1. Sr. Reg.

PSYCHIATRY
Coulsdon, Netherne. Reg. & Sr. H.O.
Dumfries, Crichton Royal. Sr. H.O.
East Anglian R.H.B. Cons.
East Anglian R.H.B. Reg.
Leeds R.H.B. Reg.
Leeds R.H.B. Sr. H.M.O.
Manchester R.H.B. P.-t. Cons. & Sr. H.M.O.
North East Met R.H.B. Sr. Reg. & Reg.
North West Met. R.H.B. Cons.
St. Alban's, Hill End. Sr. Reg.
Welsh R.H.B. Reg.
West Malling, Leybourne Grange Colony for Mental Defectives. Jr. H.M.O.

RADIOLOGY
East Anglian R.H.B. Reg.
National Hosps. for Nervous Diseases. Reg.
North Gloucestershire Clin. Area. Cons.
Sheffield R.H.B. Sr. H.M.O.
S. Africa, Prov. Admin. of Cape of Good Hope. Med. Pract., Grade D.
Wolverhampton, Royal. Reg.

RADIOTHERAPY
Leeds United Hosps. Cons.
South West Met. R.H.B. Sr. H.M.O.

RHEUMATOLOGY
Taplow, Canadian Red Cross Mem. Sr. H.O.

SURGERY
Bolingbroke, S.W.11. H.O.
Colindale, N.W.9. Reg.
Putney, S.W.15. Reg.
St. Leonard's, N.1. H.O.
St. Stephen's, S.W.10. Reg.
Wanstead, E.11. H.O.
Belfast, Royal Victoria. Sr. H.O.
Birmingham Accident. H.O.
Birmingham R.H.B. P.-t. Cons.
Birmingham, Solihull. Sr. H.O.
Birmingham United Hosps. Locum Reg.
Bishop Auckland. Gen. H.O.
Blackpool, Victoria. Sr. H.O.
Brighton. Royal Sussex County. H.O.'s.
Bristol, Southmead Gen. Hosp. Group M.C. Sr. H.O.
Burton upon Trent. Gen. H.O.
Cardiff. Royal Hamadryad Gen. & Seamen's. Sr. H.O.
Carlisle, Cumberland Infy. Sr. H.O. & H.O.'s.
Carshalton, Queen Mary's Hosp. for Child. H.O.
Chelmsford & Essex Pre-reg. H.O.'s
Cheltenham Gen. H.O.
Chesterfield Royal. H.O.
Chichester Group H.M.C. Locum Sr. Reg.
Chichester, St. Richard's. Reg.
Cuckfield, Sussex. Pre-reg. H.O.
Dublin, St. Laurence's. Reg.
Dudley, Stourbridge & Dist. Sr. H.O.
Edinburgh, Central Hosps. B.O.M. H.O.'s.
Exeter, Royal Devon & Exeter. H.O.'s.
Hasting, Royal East Sussex. Pre-reg. H.O.'s.
Hitchin, Lister. H.O.
Huddersfield Royal Infy. H.O.
Leeds R.H.B. Pre-reg. H.O.'s.
Leeds R.H.B. Reg.
Leeds United Hosps. Locum H.O. or Sr. H.O.
Louth County Infy. Sr. H.O.
Manchester, Booth Hall Child's. Locum Reg.
Manchester, Christie Hosp. & Holt Radium Inst. Sr. H.O.
Manchester R.H.B. Reg.
Newcastle R.H.B. Sr. Reg.
Newcastle R.H.B. Sr. Reg. & Locum Reg.
Northampton Gen. H.O.
North East Met. R.H.B. Reg.
Nottingham City. H.O.
Nottingham Gen. Pre-reg. H.O.
Nottingham Highbury. Sr. H.O
Plymouth, S. Devon & E. Cornwall Gen. Pre-reg. H.O.
Portsmouth Group H.M.C. Sr. H.O & Pre-reg H.O.
Slough, Upton. Locum H.O.
Stockton & Thornaby. H.O.

THORACIC SURGERY
Birmingham, Yardley Green. Sr. H.O.
Leeds R.H.B. Pre-reg. H.O.

UROLOGY
St. Peter's, St. Paul's & St. Philip's. Sr. Reg.

GENERAL PRACTICE
(Executive Councils Form E.C 16A.)
Leeds, Rothwell Urban Dist. List 5431.

PUBLIC APPOINTMENTS
Buckinghamshire C.C. Asst. County M.O.
Barbados Gen. Hosp. M.O.'s.
Devon C.C. County Psych.
British Guina Govt. M.O.'s.
H.M. Oversea Civil Service, Western Samoa. Surgeon
Birmingham City Education Committee. School M.O.
Mauritius Govt. Jr. Path.
All India Inst. for Med. Sciences New Delhi. Asst. Prof. of Orthopædics.
Meath C.C. Ireland. Lab. Tech.

NON-MEDICAL
Birmingham Dudley Road. Biochemist.

(Further particulars of above vacancies available on request to Advertisement Manager.)

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